

Notice of Allowability

Application No.

10/632,955

Examiner

Jennifer M. Dolan

Applicant(s)

NATHAN ET AL.

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amdt. of 7/13/05.
2. ☒ The allowed claim(s) is/are 36-55.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

In line 3 of claim 44, "foomed" has been replaced by --formed--.

Allowable Subject Matter

2. Claims 36-55 are allowed.
3. The following is an examiner's statement of reasons for allowance:

Regarding claims 36-42, the primary reason for allowability is the inclusion of the limitation of a photonic crystal structure having a three-layer substrate, with the center layer having a higher equilibrium carrier concentration than the external layers, and wherein a local depletion of charge carriers from the center layer is conducted in the vicinity of at least one resonant local defect, in addition to the other limitations in the claims. The closest prior art, such as US 2002/0146196 to Shirane et al., suggests carrier injection through a three layer structure, such as PIN or MSM structure, but there is no suggestion in the prior art of configuring a photonic bandgap material such that the bandgap is tuned by carrier depletion in the center layer of the three layer structure as claimed. Although it is expected that a person having routine skill

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in the art would understand that the dielectric constant of a semiconductor layer could be altered by both carrier injection and carrier depletion, it is the Examiner's opinion that it would not have been apparent to a person having ordinary skill in the art that a very highly doped layer would be usable as part of a photonic band gap structure, or that there would be any particular advantage to using a highly doped central layer and tuning through carrier depletion from that central layer.

Regarding claims 43-55, the primary reason for allowability are the limitations of having a local carrier concentration column formed around a local defect, where a change in the column carrier concentration causes a local refraction, in addition to the other limitations in the claim. The closest art of record, such as US 6,058,127 to Joannopoulos et al. and US 2002/0172456 to Hosomi generally teach dynamically controlling the photonic crystal waveguide by changing the carrier concentration of the photonic crystal material across the entire structure, rather than applying local changes in a column around a local defect. In these prior art structures, the non-local injection will change the index of refraction of the entire photonic crystal, such that both the band gap wavelengths of the photonic crystal and the resonant wavelengths of the microcavity will be changed. The prior art structure is significantly different from the claimed structure, wherein a local change in carrier concentration about a defect will only change the resonant wavelength of the microcavity without significantly changing the band gap wavelength of the photonic crystal. Since the claimed structure has these crucial differences from the prior art structures, and since the prior art fails to suggest a local, rather than a non-local change in carrier concentration around a local defect, it is the Examiner's opinion that the invention as claimed would not have been obvious to a person having ordinary skill in the art.

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4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
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DAVID BLUM
PRIMARY EXAMINER

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